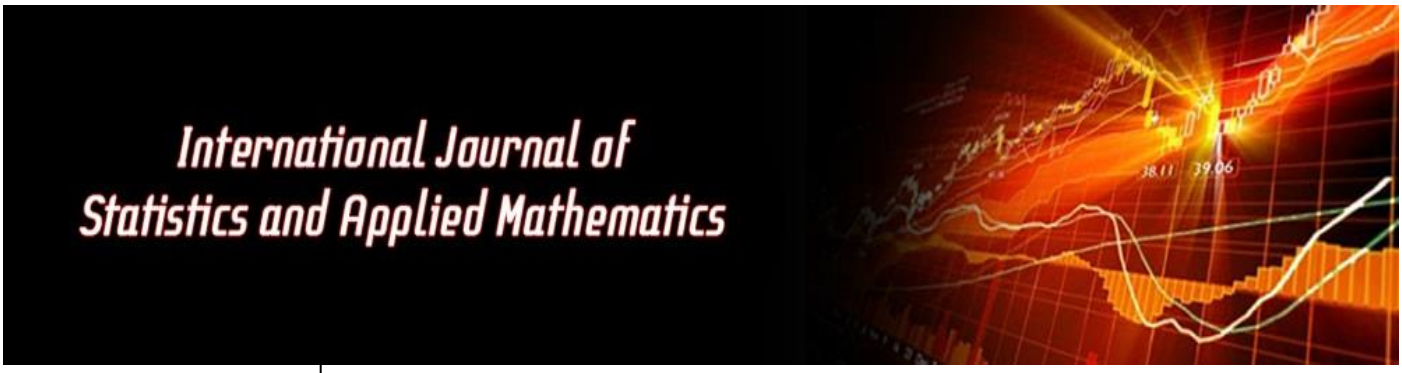

ISSN: 2456-1452
Maths 2023; SP-8(5): 303-306

https://www.mathsjournal.com
Received: 05-06-2023
Accepted: 14-07-2023

Ajith Raja A
PG Scholar, Directorate of Agricultural Business Development, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Murugananthi D
Assistant Professor, Directorate of Agricultural Business Development, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Divya K
Associate Professor, Department of ARM, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Vasanthi R
Associate Professor (Mathematics), Department of Physical Science and Information Technology, TNAU, Coimbatore, Tamil Nadu, India

Parimala Devi R
Associate Professor, Department of Bio energy, Agriculture Engineering and Research Institute, TNAU, Coimbatore, Tamil Nadu, India

Corresponding Author:
Murugananthi D
Assistant Professor, Directorate of Agricultural Business Development, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu, India

Market efficiency analysis of tapioca value chain in Tamil Nadu: A case study of Kallakurichi district

Ajith Raja A, Murugananthi D, Divya K, Vasanthi R and Parimala Devi R

Abstract
The aim of this study is to comprehensively analyze the tapioca value chain in the Kallakurichi district of Tamil Nadu, with a specific focus on assessing market efficiency. The primary objectives include investigating the various stages and channels involved in the tapioca value chain, assessing price distribution along the chain, evaluating market efficiency, identifying efficient marketing channels, and providing recommendations for enhancing the profitability and efficiency of the tapioca industry in the study area. The primary data was collected during 2022-23. This research was conducted in the Kallakurichi district due to its significant tapioca cultivation area in Tamil Nadu. Within Kallakurichi, three specific blocks were chosen: Tirukoillur, Thiyagadhurugam, and Chinnaselam. The study compared three tapioca value chains in the Kallakurichi district of Tamil Nadu: Channel I, where farmers sell directly to local merchants who supply consumers, Channel II, involving Farmers to wholesaler and to industrial consumers and Channel III, where Farmers sell directly to consumers. Channel I proved more profitable for farmers, with a higher price and marketing efficiency (1.58) compared to Channel II (1.01) and Channel III (0.72) highlighting the advantages of direct sales through local merchants in maximizing returns and market efficiency.

Keywords: Price spread, marketing efficiency, value chain, tapioca

Introduction
Tapioca, derived from the cassava plant, is a versatile root crop widely cultivated in India, particularly in states like Tamil Nadu, Kerala, Andhra Pradesh, and the North. Its drought-resistant nature and adaptability make it a valuable crop for various purposes, including human consumption, animal feed, and industrial applications such as starch and sago production. In India, tapioca is grown in approximately 1.72 lakh hectares, with a production rate of 62.12 lakh tons and a remarkable productivity rate of 32.6 tons per hectare in the year 2021-22. Tamil Nadu is a tapioca leader, cultivating the crop in 83.02 million hectares and achieving an impressive productivity rate of 92.18 metric tons per hectare in the same year. Other states like Kerala, Andhra Pradesh, and Nagaland also contribute significantly to tapioca production. The tapioca value chain involves a series of activities from cultivation to end-use, encompassing various intermediaries like traders, processors, and retailers. These activities result in a wide range of value-added tapioca products, including starch, sago, wafers, glucose, noodles, and more, serving diverse industries and consumers.

The study aims to address these challenges by investigating two key marketing channels: Channel I, characterized by direct sales from farmers to local merchants and consumers, Channel II, which involves multiple intermediaries and Channel III Involves farmers to retailers and consumers. The central issue lies in understanding the factors influencing farmers' returns and market efficiencies within these channels, ultimately seeking to provide insights and recommendations to optimize the tapioca value chain. This optimization will benefit both producers and consumers in the region by maximizing returns for farmers and improving overall market efficiency.

In an international survey involving 453 consumers across Asia and Africa, significant disparities were found, with consumers in Cameroon and Iran showing lower food safety knowledge compared to those in Ghana, Nigeria, Malaysia, and Pakistan.

Value Chain Analysis (VCA), as used by Simons *et al*. (2003) [10], examined value creation within supply chains, with a focus on manufacturing processes. McLeod *et al*. (2009) [4] studied poultry value chain mapping to address Highly Pathogenic Avian Influenza (HPAI) outbreaks in South-east Asia. Rieple and Singh (2010) [8] explored the organic cotton production value chain in India. Paulin (2011) [7] emphasized the role of market structure and business services in value chain effectiveness. Singh (2013) [11] examined Nepal's vegetable value chain. Murthy (2014) [5] investigated the castor value chain in Andhra Pradesh. Nkuba and Ndunguru (2016) [6] analyzed the rice value chain in Tanzania. Sahoo and Sarangi (2018) [9] explored organic turmeric's value chain. Mango (2018) [3] assessed the maize value chain in Malawi and Mozambique. Tarekegn (2020) [13] studied the banana value chain in Ethiopia. Hassan (2020) [2] researched horticultural crop value chains in Indian agro-climatic zones. Ayele (2021) [1] delved into the wheat value chain in Ethiopia. Srinivasan (2021) [12] investigated the castor value chain in Tamil Nadu, highlighting the impact of various stakeholders on competitiveness.

Methodology

This research was conducted in the Kallakurichi district due to its significant tapioca cultivation area in Tamil Nadu. Within Kallakurichi, three specific blocks were chosen: Tirukoillur, Thiyagadhurugam, and Chinnaselam. To ensure a representative sample, a total of five villages were randomly selected from each of these three blocks. Within each village, five farmers were chosen at random, considering their involvement in substantial tapioca cultivation. In total, the study included 100 farmers from twenty villages across the three blocks. The study also involved various intermediaries in the tapioca marketing process. Specifically, 15 wholesalers, 10 village traders, 5 retailers, and 5 processors were randomly

Price Spread

Price spread is the difference between the price that the producer receives and the price that the customer pays for a certain good in the market at a particular time. If the price spread is the lowest, the market is said to be efficient. Information was gathered from individual farmers as well as other value chain actors. The expenditures for marketing the produce comprised of expenditures for transportation, loading and unloading, packing, storage, spoiling, and other needs. The formula for price spread follows:

$$\text{Price spread} = Pp - Pf$$

Where,
Pp= Price received by the consumer
Pf = Price received by the farmer
Farmer's share in consumer's rupee
Farmer's share in consumer rupees is the price received by the farmers which expressed as a percentage to the price paid by the consumers.
The following formula was used to determine the farmers share of the consumer rupee.

$$Fs = (Fp/Cp) \times 100$$

Where,
Fs = Farmer's share in consumer rupee (percentage)
Fp = farmer price (Rs)
Cp= Consumer's price (Rs)

Result and discussion

The research study focused on Tapioca marketing in the Kallakurichi, where three channels were identified in the study area channel, known as

Channel I: Farmers – Local merchants - retailer – consumers (Raw tuber)

Channel II: Farmers - Commission Agent - Starch processor Processors – Wholesaler – industrial consumer

Channel III: Farmers- commission Agent-processor-wholesaler-Retailer – Consumers.

Table 1 provides a comparative examination of three distinct value chains in the tapioca industry within the kallakurichi district. It presents key financial data, including net prices received by farmers, marketing costs incurred by various channels, gross prices received, and marketing margins. Additionally, the table 1 highlights the price spreads for each value chain and expresses values both in Indian rupees and as a percentage of the consumer price. The data underscores the financial dynamics and distribution of costs and margins along these value chains, shedding light on their respective efficiencies and impacts on the tapioca market in the region.

Table 1: Price spread of marketing channel of Tapioca

S. No.	Particulars	Value Chain I	Value Chain II	Value Chain III
1	**Farmers**			
	Net price received	1800 (60.91)	1470(39.51)	1565(32.33)
	Marketing cost	50 (1.69)	80(2.15)	85(1.76)
	Gross price received	1850 (62.61)	1550(41.66)	1650(34.09)
2	**Local merchants**			
	Price paid	1850 (62.61)	-	-
	Marketing cost	10 (0.34)	-	-
	Marketing margin	1095 (37.06)	-	-
	Price received	2955 (100.00)	-	-
3	**Commission Agent**			
	Price paid	-	1550(41.66)	1565(32.33)
	Marketing cost	-	-	-
	Marketing margin	-	60(1.61)	55(1.14)
	Price received	-	1610(43.27)	1620(33.47)
4	**Processors**			
	Price paid	-	1610(43.27)	1620(33.47)
	Marketing cost	-	30(0.81)	60(1.24)
	Marketing margin	-	1000(26.87)	1420(29.34)

	Price received	-	3360(90.30)	3950(81.61)
5	**Wholesalers**			
	Price paid	-	3360(90.30)	3950(81.61)
	Marketing cost	-	46(1.26)	170(3.51)
	Marketing margin	-	315(8.47)	350(7.23)
	Price received	-	3721(100.00)	4635(95.76)
6	**Retailer**			
	Price paid	2955(94.86)	-	4635(95.76)
	Marketing cost	15(0.48)	-	55(1.14)
	Marketing margin	145(4.65)	-	150(3.10)
	Price received	3115(100.00)	-	4840(100.00)
7	**Consumers**			
	Price paid	3115	3721	4840
	Marketing cost	75(2.41)	156(4.19)	315(6.51)
	Marketing margin	1095(35.15)	1375(36.95)	1975(40.81)
	Price Spread	1265	2251	3275

In Value Chain I, farmers receive a net price of Rs. 1800 per unit for their tapioca, equivalent to 60.91% of the consumer price. They incur a marketing cost of Rs. 75 (2.41%), while local merchants purchase the tapioca at a price of Rs. 1850 (62.61%). Local merchants bear a marketing cost of Rs. 10 (0.34%) and have a marketing margin of Rs. 1095 (35.15%). This value chain results in a consumer price of Rs. 3115, with a price spread of Rs. 1265 (40.61%) between what consumers pay and what farmers receive.

In Value Chain II, farmers receive a lower net price of Rs. Per 1470 unit, accounting for 39.51% of the consumer price, and incur a higher marketing cost of Rs. 80 (2.15%). Commission agents purchase tapioca at Rs1550(41.66%), and Processors purchase tapioca at Rs. 1610(43.27%) incurring a marketing cost of Rs. 30(0.81%) and having a marketing margin of Rs. 1000(26.87%) wholesalers acquire it at Rs. 3360(90.30%). Wholesalers have a marketing cost of Rs. 46 (1.26%) and a marketing margin of Rs. 315 (8.47%). Consumers pay Rs. 3721 in this value chain, resulting in a significant price spread of Rs. 2251 (60.49%).

Value Chain III lacks specific data on farmers' net prices Rs. 1565 (32.33%) and marketing costs Rs. 85 (1.76%). Consumers pay Rs. 4840, leading to a substantial price spread of Rs. 3275 (67.67%) in this value chain.

In summary, Value Chain I represents a more straightforward and efficient approach for farmers, while Value Chain II, despite its complexity, generates larger margins for intermediaries at the expense of consumers. Value Chain III, with limited data, offers higher consumer prices but requires further investigation to evaluate its overall efficiency. These findings emphasize the need for optimizing the tapioca value chain to ensure fair returns for farmers while maintaining consumer affordability.

Table 2: Market efficiency in the value chains

S. No	Particulars (in Rs)	Value chain I	Value chain II	Value chain III
I	Total marketing cost	75	156	315
II	Net marketing margin	1095	1375	1975
III	Net price received by farmers	1800	1470	1565
	Acharya's marketing Efficiency [III/(I+II)]	1.58	1.01	0.72

In summary when we analyze the efficiency of market operations, in three value chains (Chain I, Chain II and Chain III) we gain insights into how resources and benefits are allocated within these chains. Here are a few key points to consider;

Chain I demonstrates the level of market efficiency with a score of 1.58. This suggests that the value chain is well organized and operates efficiently resulting in farmers receiving a portion of the generated value. It also indicates that marketing costs are relatively low while farmers enjoy returns on their investments.

Chain II exhibits market efficiency with a score of 1.01. Although it is not as efficient as Chain I it still points towards an effective value chain. There might be some opportunities for improvement by optimizing marketing costs or increasing returns for farmers.

On the hand Chain III has the market efficiency at 0.72 indicating that this particular value chain may not efficiently allocate resources and benefits compared to others. Farmers involved in this chain receive a share of the value created which could be attributed to higher marketing costs or other inefficiencies.

To summarize further market efficiency plays a role, in determining both farmer welfare and overall performance across value chains.

When the market operates efficiently it benefits farmers by creating a situation. On the hand when efficiency is lower there is room, for improvement. By analyzing and comprehending these efficiencies stakeholders can uncover opportunities to allocate resources better cut costs and increase profits, for farmers involved in the value chain.

Conclusion

In Conclusion, Value Chain I is the most efficient with fair returns for farmers and reasonable consumer prices, while Value Chain II is more complex, leading to lower farmer returns and higher consumer prices. Value Chain III, despite offering high consumer prices, requires further assessment. Optimization is essential to ensure fairness and sustainability in the tapioca industry.

Reference

1. Ayele GK. Wheat value chain analysis in Ethiopia: Conflict and market dynamics. Journal of Agricultural Economics and Rural Development. 2021;7(1):1-11.
2. Hassan MK. Regional horticultural crop value chain analysis in Indian agro-climatic zones. International Journal of Horticulture and Agriculture. 2020;7(1):1-12.
3. Mango N. Maize value chain analysis in Malawi and Mozambique: Smallholder competitiveness in the context of climate change. Journal of Development and Agricultural Economics. 2018;10(9):297-307.

4. McLeod A, Thieme O, Mack S, Rushton J, Zilberman D. Poultry value chain mapping for HPAI management: Impacts on poultry sectors and public health. Pro-Poor Livestock Policy Initiative Working Paper No. 51. Food and Agriculture Organization of the United Nations; c2009.
5. Murthy CS. Castor value chain analysis in Andhra Pradesh: Cultivation challenges and market potential. International Journal of Agricultural Science and Research. 2014;4(5):1-10.
6. Nkuba JM, Ndunguru GT. Analysis of rice value chain: The case of Kilombero district, Tanzania. African Journal of Agricultural Research. 2016;11(8):684-694.
7. Paulin M. Market structure and business services: The role of value chain effectiveness. Journal of Business Research. 2011;64(9):1000-1006.
8. Rieple A, Singh RA. Value chain analysis of the organic cotton industry: The case of UK retailers and Indian suppliers. Ecological Economics. 2010;69(11):2292-2302.
9. Sahoo A, Sarangi N. Organic turmeric value chain: A case study on cooperative producer activity in India. International Journal of Current Microbiology and Applied Sciences. 2018;7(7):1470-1477.
10. Simons D, Taylor D, Dominguez T, Zokaei K. Identifying the determinants of value in the U.K. red meat industry: A value chain analysis approach. Journal on Chain and Network Science. 2003;3(2):109-121.
11. Singh S. Vegetable value chain for sustainability: A case study of Palpa district, Nepal. International Journal of Agricultural Management and Development. 2013;3(4):237-246.
12. Srinivasan R. Castor value chain analysis in Tamil Nadu: Stakeholder impact on competitiveness. International Journal of Management Studies. 2021;8(2):1-10.
13. Tarekegn A. Banana value chain analysis in Ethiopia: The case of Arsi Negelle district. Journal of Agribusiness and Rural Development. 2020;58(2):163-172.